11 Stormwater Management

11.1 Purpose and Scope

11.1.1 The regulations of this chapter are intended to protect, maintain, and enhance the public health, safety, and general welfare by establishing minimum requirements and procedures to control the adverse effects of increased stormwater runoff associated with future land development with consideration for existing developed land within the City of Hickory. Proper management of stormwater runoff will minimize damage to public and private property, reduce personal damage and bodily harm, insure a functional drainage system, reduce the effects of development on land and stream channel erosion, assist in the attainment and maintenance of water quality standards, enhance the local environment associated with the drainage system, reduce local flooding, maintain as nearly as possible the pre-developed runoff characteristics of the area, and facilitate economic development while mitigating associated flooding and drainage impacts.

11.1.2 The application of these regulations and the provisions expressed in this chapter shall be the minimum stormwater management requirements and shall not be deemed a limitation or repeal of any other powers granted by State statute. In addition, if site characteristics indicate that complying with these minimum requirements will not provide adequate designs or protection for local property or residents, it is the designer's responsibility to exceed the minimum requirements as necessary. The City Engineer or designee shall be responsible for the coordination and enforcement of the provisions of this section.

11.1.3 Reference is hereby made to the City's Watershed Protection Overlay District requirements contained in Sec. 4.5. Stormwater Management Section is intended to complement the Overlay Districts and not to replace or alter them in any way. The converse holds true for the Watershed Protection Overlay Districts. The City's National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Ordinance is a separate document.

11.1.4 No person shall improve property by constructing buildings or structures or by increasing the imperviousness of land without having provided for appropriate stormwater management measures that control or manage runoff, in compliance with this Section, and the City's NPDES Phase II Stormwater Ordinance.

11.1.5 No person shall discharge non-stormwater into the Municipal Separate Storm Sewer System (MS4) with the exception of the following:

- water line flushing;
- landscape irrigation;
- diverted natural stream flows;
- rising ground waters;
- groundwater infiltration to storm sewers;
- pumped groundwater;
- discharges from potable water sources;
- foundation drains;
- air conditioning condensation;
- irrigation water;
- springs;
- water from crawl space pumps;
- footing drains;
- lawn watering;
- non-commercial car washing;
- flows from riparian habitats and wetlands;
- dechlorinated swimming pool discharges;
- street wash waters; and
- discharges from fire fighting activities.

11.1.6 If any of the above non-stormwater exceptions are found to be polluted and thus cause a negative impact on the quality of the surface waters of Hickory, said situation or occurrence shall be deemed unlawful and shall not be allowed to discharge to the (MS4). Such situations or occurrences shall be considered an illicit connection or improper disposal as defined in this Section.

11.2 Definitions *(TA 18-01)*

Unless specifically defined below, words or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage and to give this chapter its most reasonable application. The definitions of this section shall be used solely for the purpose of interpreting and administering the Stormwater Management provisions of this chapter.

Term	Definition
As-built plan	The certified construction plans with any changes identified and shown on the plan as constructed.
City of Hickory	All area within the City including the extraterritorial planning jurisdiction, "ETJ".
City Engineer	The City Engineer of Hickory or his designee.
City Manager	The City Manager of Hickory, North Carolina.
Cross-drain culvert	A culvert crossing under a public roadway.
Designer	A professional who is permitted to prepare plans and studies required by this ordinance.
Detention structure	A permanent structure for the temporary storage of runoff that is designed so as not to create a permanent pool of water.
Development	Any of the following actions undertaken by a public or private individual or entity: any land change, including, dredging, grading, excavating, transporting and filling of land, and increasing the imperviousness of land.
Developed land use conditions	The land use conditions at build out according to the current city zoning map or proposed development plan.
Easement	A grant or reservation by the owner of land for the use of such land by others for a specific purpose or purposes, and which must be included in the title conveyance of land affected by such easement.
Erosion	The process by which ground surface is worn away by the action of wind and/or water.
Existing land use condition	The land use conditions existing at the time the design plans are submitted for approval.
Hydraulic study	A study of water flowing through conveyance systems including pipes, open channels, culverts, storage facilities, or any elements of the drainage system.
Hydrologic study	A study that documents the flow calculations needed to estimate flood magnitudes. The primary information from a hydrologic study will be peak flow values and/or hydrographs needed to characterize storms for a particular design application.
Illicit connection	Any connection to the municipal separate storm sewer which discharges non-permitted non-stormwater to the MS4.
Impervious	The condition of being impenetrable by water.
Imperviousness	The degree to which a site is impervious.
Improper disposal	The releasing of matter or fluids other than atmospheric precipitation at a location where the matter or fluid can enter the municipal separate storm sewer system.
Infiltration	The passage or movement of water into the soil subsurface.
Interior culvert	A culvert that is not located under a public roadway.
Maintenance	Any action necessary to preserve stormwater management facilities in proper working condition, in order to serve the intended purposes set forth in paragraph 9.12.1(a) of this Land Development Code and to prevent structural failure of such facilities. Maintenance shall not

	include actions taken solely for the purpose of enhancing the aesthetic aspects associated with stormwater management facilities.
Municipal separate storm sewer system (MS4)	A conveyance or system of conveyances (including roads with drainage systems, catch basins, curbs, gutters, ditches, man made channels, or storm drains) that is maintained by the City of Hickory, is generally in a dedicated public right of way, and is designed or used for the collection or conveying of stormwater. This does not include a privately owned or operated conveyance or system of conveyances.
Non-stormwater	Any flow that is discharged to the municipal separate storm sewer system that is not from a form of natural precipitation.
On-site stormwater management	The design and construction of a facility or facilities necessary to control stormwater runoff within and for a single development.
Pre-developed conditions	Those land use conditions that were existing on the site prior to development, when the site was in its natural undisturbed condition.
Preliminary plat	The preliminary plat of a subdivision submitted pursuant to the subdivision regulations of this Land Development Code.
Regulated Flood Plain	Those flood plain areas designated by the Federal Emergency Management Agency (FEMA) and included in the City of Hickory Floodway and Floodway Fringe Zoning Regulations and County FEMA maps which apply to Hickory's Extraterritorial Jurisdiction.
Retention structures	A permanent structure that provides for the storage of runoff and is designed to maintain a permanent pool of water.
Stormwater	Water resulting from naturally occurring precipitation, including rain, hail, sleet, snow melt and surface runoff and drainage.
Stormwater Design Manual	The latest edition of the Stormwater Design Manual published by the North Carolina Department of Environmental Quality, Division of Energy, Mineral, and Land Resources (NCDEQ DEMLR).
Stormwater design plan	The set of drawings and other documents that comprise all of the information and specifications for the drainage systems, structures, concepts and techniques that will be used to control stormwater. Also included are the supporting engineering calculations and results of any computer software analysis.
Stormwater management	The collection, conveyance, storage, treatment and disposal of stormwater runoff in a manner to minimize accelerated channel erosion, increased flood damage, and/or degradation of water quality and in a manner to enhance and ensure the public health, safety, and general welfare.
Stormwater management facilities	Those structures and facilities that are designed for the collection, conveyance, storage, peak flow reduction, treatment and disposal of stormwater runoff into and through the drainage system.
Stormwater Control Facilities	Those structures and facilities that are designed for storage and peak flow reduction of stormwater runoff into and through the drainage system.

11.3 Warning and Disclaimer of Liability

11.3.1 The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations.

11.3.2 On rare occasions greater floods can and will occur, and flood heights may be increased by man-made or natural causes. This chapter does not imply that land outside the floodplain areas or

uses permitted within such areas will be free from flooding or flood damages. Moreover, this chapter does not imply that no damage will occur as a result of flooding from stormwater management facilities.

11.3.3 This chapter shall not create liability on the part of the City or any officer or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made hereunder.

11.4 Stormwater Design Plans

11.4.1 Stormwater Design Plans

Stormwater design plans shall be required for non-residential development and multiple family residential development and subdivisions that require the installation of stormwater management facilities. Stormwater design plans are detailed plans, specifications and calculations as described herein illustrating how the stormwater is going to be managed on the property including specific design information for all pipes, ditches, catch basins, retention ponds, detention ponds, siltation ponds and other stormwater management structures and facilities. Stormwater design plans are intended to ensure that the effects of increased impervious areas on stormwater are addressed in the project design.

The applicant shall submit a stormwater design plan (as part of the construction plans or Land Development Permit for subdivisions) to the City Engineer for review and approval.

If any design plan involves any stormwater management facilities or land to be dedicated to public use, the same information shall also be submitted for review and approval to any agency having jurisdiction over the land or other appropriate departments or agencies identified by the City Engineer for review and approval. This design plan shall serve as the basis for all subsequent construction.

The stormwater design plan will be reviewed, if requested, with the designer at a scheduled review meeting within ten (10) working days after submittal. It will then either be approved, approved with changes, or rejected. If rejected, changes, additional analysis, or other information needed to approve the next submittal of the design plan shall be identified.

Within fifteen (15) working days from and after the receipt of the final stormwater design plan, the City Engineer shall issue a decision approving, rejecting or conditionally approving a plan with modification.

The construction of a single family dwelling on a single lot shall only be required to submit a Grading Permit Application. (This does not waive any sedimentation requirements enforced by the State of North Carolina.)

11.5 Permit requirements

No one shall create or commence with land disturbance on parcels or development project sites less than one (1) acre in size without obtaining a grading permit from the City of Hickory. Applicable projects on parcels or development project sites equal to or greater than one (1) acre shall be permitted in accordance with the State of North Carolina's erosion control requirements and the stormwater design plan requirements contained in this code, and the requirements of the NPDES Phase II Stormwater Ordinance.

11.6 Fees

Fees for inspections and other fees associated with this ordinance are determined by the City Council. Fee schedules can be obtained from the City Engineering Department.

11.7 Permit suspension and revocation

11.7.1 In addition to the remedies provided in Chapter 13 of this code, a grading permit may be suspended or revoked after a certified letter is sent to the owner or authorized representative stating that one of the following violations has been committed:

- any violation(s) of the conditions of the grading permit approval;
- construction not in accordance with the approved plans; or
- non-compliance with correction notice(s) or stop work orders(s).

11.7.2 Additionally, the City Engineer may suspend any grading permit when the Engineer identifies an immediate danger in an area downstream of the permitted work. Permits may be suspended pursuant to this subsection irrespective of whether the permit holder has violated the terms of the permit and shall be suspended to such an extent as is necessary to protect the public health, safety and welfare.

11.8 Peak Flow Reducing Stormwater Control Facilities Requirements

11.8.1 Peak flow reducing stormwater control facilities shall be required on parcels or development project sites equal to or greater than one (1) acre for non-residential development and multiple family residential development as noted below. Development on parcels or project sites less than one (1) acre are not exempt if they are part of a larger common plan of development or sale, even though multiple, separate, or distinct activities take place at different times on different schedules.

The minimum peak flow reducing stormwater control requirements shall provide control measures necessary to control velocities of flow from stormwater management facilities to a level which will not cause erosion or other velocity related problems at the exit of all stormwater management facilities and downstream. In addition, stormwater control measures shall be provided to limit the 2-year and 10-year developed peak discharge rates to pre-developed peak discharge rates. The design of these facilities shall be based on guidelines contained in the City's Manual of Practice and the NCDEQ, DEMLR Stormwater Design Manual as applicable.

11.8.2 For all stormwater control facilities, a hydrologic-hydraulic study shall be done showing how the drainage system will function with and without the proposed facilities. For such studies the following land use conditions shall be used:

For the design of the peak flow reducing facility outlet structure, use developed land use conditions for the area within the proposed development and existing use conditions for upstream areas draining to the facility.

For any analysis of flood flows downstream from the proposed facility, use existing conditions for all downstream areas.

All stormwater management control facilities emergency spillways shall be checked using the 100-year storm and routing flows through the facility and emergency spillways. For these analyses, developed conditions shall be used for all areas within the analysis.

11.9 Stormwater management facilities

11.9.1 Stormwater management facilities may include both structural and nonstructural elements. Natural swales and other natural runoff conduits shall be retained where practicable.

11.9.2 Where additional stormwater management facilities are required to satisfy the minimum control requirements, the following measures are examples of what may be used in their order of preference, with the first being the most desirable:

- Facilities designed to encourage overland flow, slow velocities of flow, and flow through buffer zones.

- infiltration practices;
- Other stormwater control facilities as contained in the NCDEQ, DEMLR Stormwater Design Manual.

11.9.3 Where structural facilities are used, designs which consolidate these facilities into a limited number of large structures will be preferred over designs that utilize a large number of small structures.

11.9.4 Stormwater design plans can be rejected by the City Engineer if they incorporate structures and facilities that will demand considerable maintenance, will be difficult to maintain, or utilize numerous small structures if other alternatives are physically possible.

11.9.5 The drainage system and all stormwater management facilities within the City (including both public and private portions) will be designed to the same engineering and technical criteria and standards. The City Engineering Department's review will be the same whether the portion of the drainage system will be under public or private control or ownership.

11.9.6 All stormwater management facilities shall be designed in accordance with the design guidance contained in the Manual of Practice, the NCDEQ, DEMLR Stormwater Design Manual, and best engineering practices.

11.9.7 All new culverts, bridge openings, or other openings in the drainage system shall be designed using developed land use conditions (as shown on current zoning maps) for upstream areas.

11.10 Plan requirements

Stormwater design plans shall include as a minimum the following:

11.10.1 Location, dimensions, elevations, and characteristics of all stormwater management and control facilities.

11.10.2 Design plans for all subdivisions shall include delineation of all sub-basins and calculations for sizing all drainage ways, including pipes and ditches. For all ditches, calculations shall be provided showing equivalent pipe sizes and driveway culvert sizes for each lot.

11.10.3 Stormwater design plans shall include designation of all easements needed for inspection and emergency maintenance of the drainage system and stormwater management facilities. At a minimum, easements shall have the following characteristics:

(1) provide adequate access to all portions of the drainage system and structures;
(2) provide sufficient land area for maintenance equipment and personnel to adequately and efficiently maintain the system with the following criteria:
    (a) a minimum of ten (10) feet on both sides of the centerline of piped systems thirty-six (36) inches in diameter and less,
    (b) a minimum of fifteen (15) feet on both sides of the centerline of piped systems greater than thirty-six (36) inches in diameter,
    (c) a minimum of ten (10) feet from top of bank along both sides of all drainage ways, streams, channels, etc., plus an additional fifteen (15) feet along one side, and
    (d) a minimum of twenty-five (25) feet around the perimeter of all detention and retention facilities. This distance shall be measured from the top of the bank and toe of the dam, as appropriate.

Restriction on easements shall include prohibiting all fences without gates and structures that would interfere with access to the easement areas and/or the maintenance or function of the drainage system.

11.10.4 A plan for maintenance of privately owned stormwater management facilities shall be included as part of the stormwater design plan which as a minimum shall specify:

- Types of maintenance activities that should be anticipated so that the proposed drainage system and stormwater management facilities will operate as designed.
- The frequency and amount of maintenance that should be anticipated.
- A planned maintenance schedule and checklist.
- Identification of the owner(s) responsible for maintenance.

11.10.5 The stormwater design plan shall include all engineering calculations needed to design the system and associated structures.

11.11 Plan criteria

The hydrologic criteria to be used for the stormwater design plans shall be as follows:

11.11.1 25-year 24-hour design storm (minimum) for all cross-drainage facilities.

11.11.2 10-year 24-hour design storm for all interior culverts and drainage designs, i.e., roadside ditches, storm sewers, etc.

11.11.3 2-year and 10-year 24-hour design storms for all detention and retention basins using procedures contained in the Manual of Practice or procedures approved by the City Engineer. Check for 100-year 24-hour storm in accordance with provision in Sec. 11.8.

11.11.4 All hydrologic analysis will be based on land use conditions as specified in Sec. 11.8.2.

11.12 Professional Licensure Requirements

Stormwater design plans that are incidental to the design of developments shall be prepared by a qualified licensed North Carolina Professional Engineer, Surveyor or Landscape Architect. Stormwater control facilities shall be prepared by a qualified licensed North Carolina Professional Engineer, using acceptable engineering standards and practices.

11.13 Inspection And Maintenance

11.13.1 Ownership and maintenance of stormwater management facilities.

All stormwater drainage systems which are located in City street rights-of-way will be maintained by the City only after they are accepted by the City.

All stormwater management facilities located off of City rights-of-way shall be privately owned and maintained; provided, however, the owner thereof shall grant to the City, a perpetual, non-exclusive easement which allows for public inspection and emergency repair, in accordance with the terms of the maintenance agreement set forth in Sec. 11.17.

Where the stormwater system is designed to service multiple lots and is not dedicated to the City, a homeowner's association or other City approved entity shall be created and shall be vested with the responsibility for the perpetual maintenance of the stormwater system.

11.14 Financial Security

Financial security requirements are contained in Sec. 4.5.

11.15 Inspection schedule

11.15.1 Prior to the approval of the stormwater design plan, the applicant shall submit a proposed staged inspection and construction control schedule. The design plan shall indicate a phase line for approval. Otherwise the inspection and construction control schedule will be for the entire drainage system.

11.15.2 No stage of work shall proceed until the preceding stage of work, according to the sequence specified in the approved staged inspection and construction control schedule, is inspected and approved.

11.15.3 Any portion of the work that does not comply with the stormwater design plan shall be promptly corrected by the permittee.

11.15.4 The permittee shall notify the City Engineer upon commencing any work to implement the stormwater design plan and upon completion of the work.

11.16 As-Built Certifications and Final Submittals

11.16.1 Upon completion of the project, and before a permanent certificate of occupancy shall be granted, the permittee shall provide an "as-built" plan certified by a qualified licensed professional (as outlined in Sec. 11.12) to be submitted upon completion of a stormwater control facility and any other related stormwater management facilities dedicated to the City.

11.16.2 The registered professional shall certify to the City Engineer that:

(1) the facility has been constructed as shown on the "as-built" plan and
(2) the facility meets the approved stormwater design plan and specifications or achieves the function for which it was designed.

11.16.3 A final inspection will be conducted by the City Engineer upon completion of the stormwater management facilities to determine if the completed work is constructed in accordance with the approved stormwater design plan.

11.16.4 Upon satisfactory results of the final inspection, the owner shall provide:

(1) The necessary easements and final survey plat for the stormwater control measure and stormwater control structure ready for recording with the Register of Deeds.
(2) Certification and as-built drawings.
(3) A maintenance security in an amount as outlined in Sec. 8.15.

11.17 Operation and Maintenance Agreement

11.17.1 Requirements related to the Operation and Maintenance Agreement and Maintenance Manual are contained in Sec. 4.5.

11.17.2 A proposed inspection and maintenance agreement shall be submitted to the City Engineer for all private on-site stormwater control facilities prior to the approval of the stormwater design plan. Such agreement shall be in form and content acceptable to the City Engineer and shall be the responsibility of the private owner. Such agreement shall provide for access to the facility by virtue of a non-exclusive perpetual easement in favor of the City at reasonable times for inspection by the City Engineer.

11.17.3 The agreement shall provide that preventive maintenance inspections of stormwater control facilities shall be performed by a qualified professional on an annual basis.

11.17.4 Inspection reports, on forms provided by the city, shall be submitted to the City Engineer on/or before the first and each subsequent anniversary of the as-built certification.

11.17.5 The agreement shall provide that if, after an inspection, the condition of a facility presents an immediate danger to the public health, safety or general welfare because of unsafe conditions or improper maintenance, the City shall have the right, but not the duty, to take such action as may be necessary to protect the public and make the facility safe. Any cost incurred by the City shall be paid by the owner(s) as set forth in subsection 11.17.7 below.

11.17.6 The agreement shall be recorded in the Register of Deeds that has jurisdiction over the development prior to the final inspection and approval.

11.17.7 The agreement shall provide that the City Engineer shall notify the owner(s) of the facility of any violation, deficiency or failure to comply with this Ordinance found during an inspection of the facility. The agreement shall also provide that upon a failure to correct violations requiring maintenance work, within a reasonable period of time, the City Engineer may provide for all necessary work to place the facility in proper working condition. The owner(s) of the facility shall be assessed the costs of the work performed by the City pursuant to this subsection and subsection 11.17.5.

11.18 Maintenance of pre-existing stormwater management facilities

11.18.1 All stormwater management facilities located outside of City rights-of-way shall be maintained by the owner(s) thereof in such a manner as to maintain and enhance the public health, safety and general welfare. All such maintenance of such facilities shall be at the sole cost and expense of owner(s) thereof. Such facilities shall be maintained so as to:

- prevent injury or harm to persons or property;
- reduce and minimize damage to public and private property;
- reduce and minimize the impact of such facilities on land and stream channel erosion;
- assist in the attainment and maintenance of water quality standards;
- reduce local flooding; and
- maintain, as nearly as possible, the pre-development runoff characteristics of the area.

11.18.2 Failure to maintain a stormwater management facility as outlined above shall constitute public nuisance. The City Engineer shall be entitled to inspect all pre-existing stormwater management facilities subject to this Ordinance at all reasonable times in order to determine compliance or non-compliance with the terms and provisions hereof.

11.18.3 Subject to the terms of subsection 11.18.6 below, the City Engineer shall provide written notice to the owner or the person in possession, charge or control of such property stating that in the judgment of the City Engineer the conditions existing upon the property constitute a nuisance, setting forth action to be taken to eliminate the objectionable conditions, and requesting that such action be undertaken within the number of days specified in the notice. The notice shall further state that unless the objectionable conditions are voluntarily removed or remedied within the time specified, the City Engineer will take the appropriate actions to eliminate the objectionable conditions and bill the property owner for all costs incurred.

11.18.4 The City Engineer is hereby directed to take all legal actions necessary to correct any nuisances including actions that are necessary to remove from the property such objectionable conditions constituting the nuisance and to charge the cost and expense thereof to the owner(s) or the person(s) in possession.

11.18.5 If the charges and costs provided for in subsection 11.18.4 above remain unpaid by the owner for a period of thirty (30) days after notice thereof to the owner of the property upon which such conditions existed, the City Manager shall cause an execution to be issued against the owner(s) of the property for those charges. The execution shall be a lien on the property and shall be a lien on all of the property of the defendant in execution from the date of such recording.

11.18.6 Nothing contained in the Ordinance shall impair the right or ability of the City Attorney to exercise any and all other remedies available, at law or in equity, including without limitation, the pursuit of injunctive relief, under emergency circumstances where there exists the danger of bodily injury or death.

11.18.7 If the City assists or has assisted private owners with the design, supply and/or installation of stormwater management facilities, this does not imply any maintenance

responsibilities by the City. The maintenance of all such facilities shall be the sole responsibility of the property owner(s).

11.19 Appeals

Appeals shall be processed as provided in Sec. 2.10.